G L O B A L
USER MANUAL

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FOREWORD

In February 2005 GS1 was officially launched as the successor to the organisations previously know as EAN and UCC. Throughout 2005 a series of events took place to promote the GS1 launch world wide which included all Member Organisations adopting a new name GS1 *(country name)*:

- GS represents our role in global standards and symbolises a synergy between business processes and one global system of standards that are open to everyone.
- The “1” represents one global standard, one global organisation and one name emphasising that GS1's standards, services and solutions are interchangeable and integrated.

The objective of the GS1 Global User Manual (GUM) is to provide an introductory "user-friendly" and simple document describing the GS1 System with particular focus on the GS1 Bar Codes and Identification Keys. This document is not exhaustive and does not replace the *GS1 General Specifications*, which remains the standard reference document.

The examples chosen are mainly from the retail sector, however the principles and standards introduced in this document apply to all sectors that are willing to benefit from the GS1 System.

DISCLAIMER:
Please note that the bar code symbols used in this manual are only examples and are not intended to be scanned or used as references.

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1. INTRODUCTION

Rapid evolution of roles in the value chain, new channels of distribution, shifting demand patterns and increased service expectations have raised the critical importance of information technology in business processes.

The GS1 Standards facilitate national and international communication between all trading partners participating in supply and demand chains, including raw material suppliers, manufacturers, wholesalers, distributors, retailers, hospitals and final clients or consumers.

Many businesses are expanding their distribution channels towards markets and clients that may not be traditional for them, into other sectors of industry or are required to meet traceability requirements. A business that chooses an industry-specific standard will face the potentially high costs of maintaining multiple systems if it wants to sell its products or services or simply communicate outside its "closed-world".

Many operations which are essential for the efficiency of trade and the optimisation of the supply and demand chains depend on the accuracy of identification of the products exchanged, services rendered, and/or locations involved.

The GS1 System is a set of standards enabling the efficient management of global, multi-industry supply chains by uniquely identifying products, shipping units, assets, locations and services. It facilitates electronic commerce processes including full tracking and traceability.

The identification numbers can be represented in bar code symbols to enable electronic reading at point of sale, when being received at warehouses, or at any other point where it is required in business processes. The system is designed to overcome the limitations of using company, organisation or sector specific coding systems, and to make trading much more efficient and more responsive to customers.

These identifying numbers are also used in electronic data interchange (EDI) and Global Data Ssynchronisation to improve the speed and accuracy of communication. This manual only provides information about the numbering system, bar codes, and scanning. For information about EDI or GDSN, please refer www.gs1.org.

As well as providing unique identifying numbers, the system also provides for additional information such as best before dates, serial numbers and batch numbers to be shown in a bar coded form. These are particularly important to achieve traceability.

Following the principles and design of the GS1 System means that users can design applications to process GS1 data automatically. The system logic

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guarantees that data captured from bar codes produces unambiguous electronic messages and the processing of them can be fully pre-programmed. The system is designed to be used in any industry, trade or public sector, and any changes to the system are introduced so that they do not disrupt current users.

The application of the GS1 System can result in significant improvements in logistic operations, reduction of paperwork costs, shorter order and delivery lead times, increased accuracy and better management of the supply and demand chains. Enormous costs savings are realised daily by user companies who have adopted the GS1 System, because they apply the same solution for communicating with all their trading partners, while remaining entirely free to run internal applications at their own discretion.

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2. BASICS AND PRINCIPLES OF THE GS1 SYSTEM

2.1. AREAS OF APPLICATIONS

The GS1 System has different areas of application that include trade items, logistic units, assets and locations.

These applications rely on data structures by which all relevant items and their data can be identified. The numbers are the keys to access databases and to identify unambiguously items handled, in all messages of a transaction. The data structures are used to ensure globally unique identification and do not give any meaning in the number. All information that describes a product or a service and its characteristics are to be found in databases. They are communicated from a supplier to a user once, before the first transaction either by using standard messages or by consultation of electronic catalogues.

The numbers are represented in bar codes to allow automatic data capture at each point where an item leaves or enters a premises.

Bar codes are usually included in the production process at the producer site; they are either pre-printed with other information present in the packaging, or a label is affixed to the item on the production line.

The same numbers are also used in EDI messages to allow all information on the transaction of the item to be transferred to the relevant trading partners. The data structures that are provided guarantee world-wide uniqueness within the relevant area of application.

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2.2. NUMBERING SYSTEM

The numbering system has three main elements, which are explained in this manual: Global Trade Item Number, SSCC and Global Location Number.

♦ GLOBAL TRADE ITEM NUMBER (GTIN)

The GTIN is a number used for the unique identification of trade items world-wide.

> A trade item is any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, ordered or invoiced for trade between participants at any point in any supply chain.

The identification and symbol marking of trade items enables the automation of the retail point-of-sale (through price look up files), of products receiving, inventory management, automatic re-ordering, sales analysis, and a wide range of other business applications.

Examples: A can of paint sold to a final consumer, a box of 6 cans of paint, a case containing 24 boxes of one kilo of lawn fertiliser, a multi-pack consisting of one shampoo and one conditioner.

♦ SERIAL SHIPPING CONTAINER CODE (SSCC)

The SSCC (Serial Shipping Container Code) is a number, which is used for the unique identification of logistic (transport and/or storage) units.

> A Logistic Unit is an item of any composition established for transport and/or storage which needs to be managed throughout the supply chain.

SSCC can be encoded in a GS1-128 bar code. Scanning the SSCC marked on each Logistic Unit allows the physical movement of units to be individually tracked and traced by providing a link between the physical movement of items and the associated information flow. It also provides the opportunity to implement a wide range of applications such as cross docking, shipment routing, automated receiving, etc.

Examples: A box containing 12 skirts and 20 jackets in various sizes and colours is a Logistic Unit as is a pallet of 40 cases each containing 12 cans of paint.

♦ GLOBAL LOCATION NUMBER (GLN)

The GLN is a number used to identify a company or organisation as a legal entity. GLNs are also used to identify physical locations.

The use of location numbers is a pre-requisite for efficient EDI.

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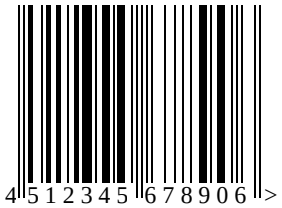
2.3. BAR CODE SYMBOLOGIES

Three bar code symbologies are very widely used in the GS1 System, (a) EAN/UPC, (b) ITF-14 and (c) GS1-128. Only the EAN/UPC Bar Codes should be used for reading at point-of-sale, whereas in other applications, such as back-door receiving or in warehouses any of the three different symbologies can be used, EAN/UPC, ITF-14 or GS1-128. Advice on choosing between them is given in Chapter 6.4.

(a) The EAN and UPC symbols can be read omnidirectionally. They must be used for all items that are scanned at the Point-of-Sale and may be used on other trade items

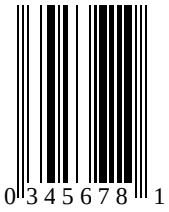
EAN-13



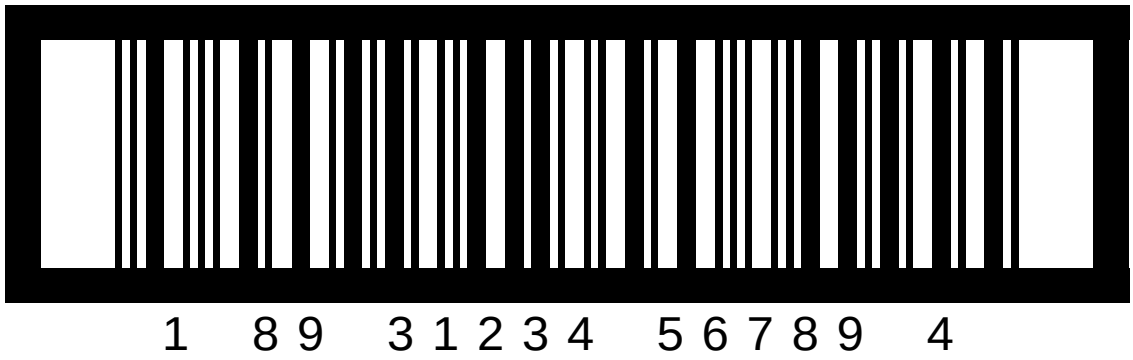
UPC-A

EAN-8

UPC-E



(b) The use of the ***ITF-14 (Interleaved 2 of 5) Symbology*** is restricted to the bar coding of identification numbers on trade items NOT passing through retail checkouts. This symbology is better suited for direct printing onto corrugated fibreboard.



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(c) The ***GS1-128 Symbology*** is a variant of Code 128 Symbology. Its use is exclusively licensed to GS1. It is not intended to be read on items passing through retail checkouts. This is the only GS1 endorsed symbology that allows the encoding of information beyond GTIN.

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3. IDENTIFICATION OF TRADE ITEMS

A trade item is defined as any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, ordered or invoiced at any point in any supply chain. This definition covers raw materials through to end-user products and also includes services, all of which have pre-defined characteristics.

The trade items are numbered by a GTIN using four data structures: GTIN-8, GTIN-12, GTIN-13 and GTIN-14 that can be stored in a 14-digit field. The choice of data structure depends on the nature of the item and on the scope of the user's applications.

A major application of the GS1 System is the identification of items intended for scanning at the retail point of sale – retail items. These are to be identified with a GTIN-13 Number. If they are very small a GTIN-8 Number (or a zero-suppressed UCC-12) is used.

Since January 2005, North American users accept GTIN-13 Identification Numbers and EAN-13 Bar Codes. Prior to this time, companies selling goods in the American and Canadian markets were required to use a GTIN-12 data structure represented in a UPC-A or UPC-E Symbol.

A trade item which can be sold in different measures is known as a Variable Measure Trade Item, for example pre-packed fruit and vegetables or meat products sold by weight, and such trade items are subject to specific rules described in Chapter 9. Specific rules also exist for books, serial publications, printed sheet music or products that are not sold in open environments. These special cases are treated in Chapter 10.

Trade items not sold through retail outlets may be packaged in a wide variety of ways such as a fibreboard case, a covered or banded pallet, a film-wrapped tray, a crate with bottles, etc.

Such items can be identified in different ways:

- By allocating a specific GTIN-13, GTIN-12, or GTIN-8 Number.
- Alternatively, by allocating a GTIN-14 Number. This is formed by taking the number allocated to the trade item contained, and preceding the number by an indicator, which can take the value 1 to 8. This solution is only available for homogeneous groupings of standard trade items, where all units contained in the group are identical.

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GTIN-13: 5412150000154

either:
GTIN-14: **1**5412150000151
or:
GTIN-13: 5412150000161

either:
GTIN-14: **2**5412150000158
or:
GTIN-13: 5412150000178

These examples show both numbering solutions.

3.1. GTIN NUMBERING STRUCTURES

There are four numbering structures for GTIN that are described below.

GTIN-13 Data Structure

GS1 Company Prefix → , Item Reference ←	Check Digit
N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11} N_{12}	N_{13}

GTIN-12 Data Structure

U.P.C. Company Prefix → Item Reference ←	Check Digit
N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11}	N_{12}

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GTIN-8 Data Structure

GTIN-8 Prefix →	← Item Reference	Check Digit
N_1 N_2 N_3 N_4 N_5 N_6 N_7		N_8

- **GS1 Company Prefix**

The first two or three digits N_1, N_2, N_3 constitute the GS1 Prefix allocated by GS1 Global Office to each GS1 Member Organisation. It does not mean that the item is produced or distributed in the country to which the prefix has been allocated. The GS1 Prefix only denotes the Member Organisation that allocated the Company Number.

The GS1 Company Number that follows the GS1 Prefix is allocated by the Member Organisation.

The GS1 Prefix and the Company Number form the GS1 Company Prefix. In general it comprises six to ten digits depending on the needs of the company.

- **Item Reference**

The Item Reference is composed typically of one to six digits. It is a non-significant number, which means that the individual digits in the number do not relate to any classification or convey any specific information.

The simplest way to allocate Item References is sequentially, that is 000, 001, 002, 003, etc.

- **Check Digit**

The Check Digit is the last digit (rightmost) of the GTIN. It is calculated from all other digits in the number, in order to ensure that the bar code has been correctly scanned or that the number is correctly composed.

GTIN-14 Data Structure

Indicator	GTIN of the items contained (without Check Digit)	Check Digit
N_1	N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11} N_{12} N_{13}	N_{14}

- **Indicator**

This is only used in the GTIN-14 Number. It takes the value 1 to 8 for fixed quantity trade items. The value 9 for variable quantity trade items. The simplest way to allocate the indicator is sequentially that is 1, 2, 3… to each grouping of a trade unit.

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Warning!
The number must always be used as a whole. No processing of data should be based on any part of a GTIN.

The local structures of GS1 Company Prefixes and Item References to be completed by each Member Organisation.

3.2. WHO IS RESPONSIBLE FOR NUMBERING TRADE ITEMS?

♦ The general rule

The brand owner, the organisation that owns the specifications of the product regardless of where and by whom it is manufactured, is normally responsible for the allocation of the GTIN. On joining a GS1 Member Organisation the brand owner receives a GS1 Company Prefix, which is for the sole use of the company to which it is assigned. The GS1 Company Prefix may not be sold, leased or given, in whole or in a part, for use by any other company. The brand-owner will therefore be:

- The manufacturer or supplier
  If a company manufactures the product itself or has it manufactured in any other country and sells it under a brand name that belongs to the manufacturer or supplier.

- The importer or wholesaler
  If the importer or wholesaler has the product manufactured in any country and sells it under a brand name that belongs to the company. If the importer or wholesaler changes the product (for example by modifying the packaging of the article).

- The retailer
  If the retailer has the product manufactured in any country and sells it under a brand name that belongs to the retailer.

♦ Exceptions

- If an item is not given a GTIN at source, the importer or intermediary may, at the request of its clients, assign it a *temporary* GTIN. However, it is preferable for the manufacturer to assign the number. On the other hand, the retailer can assign an *internal* number to an item that does not yet have a GTIN assigned to it, for use within the store. This method is described in the section dealing with company internal numbering and is found in Chapter 10.

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- Items that are non-branded - have no brand name or are generic items, not private labels are still assigned GTINs by their manufacturer. As different manufacturers may supply items that appear identical to the consumer, it is possible that items that are apparently the same have different GTINs. Companies that trade these items need to organise their computer applications (replenishment programs for example) to cope with this eventuality. Examples of items that sometimes have no brand are plasterboard, candles, drinking glasses, etc.

Warning!
Some companies produce the same article in several countries, or in several plants. In this case the GTIN should be allocated centrally and managed by one of the companies in the group or one of its production facilities.

3.3. WHAT TO CONSIDER WHEN NUMBERING A TRADE ITEM?

A separate unique GTIN is required whenever any of the pre-defined characteristics of an item are different in any way that is relevant to the trading process. This implies that each variant must be assigned a different number whenever the variation is, in any way, apparent and significant to any partner in the supply chain, to the final user or to the retail customer.

What is understood to be an apparent and significant variation may differ from industry to industry. Therefore these rules should be respected.

The basic characteristics of a trade item are:
- The Product Name, Product Brand, and Product Description
- The trade item type and variety
- The net quantity of a product
- If the trade item is a grouping, the number of elementary items contained, and their sub-division in sub-packaging units, the nature of the grouping (carton, pallet, box-pallet, flat-pallet…)

This list is not exhaustive.
The company responsible for allocating the numbers must ensure that each trade item corresponds to one and only one GTIN. Once it has been defined, the GTIN of the trade item must not change as long as the characteristics of the trade item do not change.

A major modification of one of the basic elements which characterises the trade unit will generally lead to the allocation of a new GTIN. Examples:

- Allocate a new GTIN: the net volume of mineral water has increased from 0.25 litre to 0.33 litre;
- Maintain the same GTIN: the colour of a juice bottle label has been changed from pale pink to darker pink.

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In general, for products where the date is important, different trade item numbers are required. Examples would be the various vintages of a wine, successive editions of a road map, annual guides, diaries or appointment books. These all constitute different trade items.

If a new GTIN is allocated to an item, the GTIN assigned to any grouping containing that item should also be assigned a new GTIN.

However, it should be noted that:

- Price is not a relevant criteria for changing a GTIN except when the price is printed directly on the trade item.
- National, federal or local regulations may apply and take precedence over these rules. For example, in some industries such as healthcare, regulations or other requirements may dictate that any trade item changes require a new GTIN.

The detailed rules for GTIN Allocation in various business situations can be found on the website www.gs1.org/gtinrules. It also gives a detailed rationale and consequence of not following the given rule.

♦ Packaging configuration

One trade item package/container may be contained in another trade item package/container. Each level of a trade item must have its own GTIN; GTIN-13, GTIN-12, GTIN-8, or GTIN-14 depending on whether it is a retail item or not. If not, it depends on the numbering option adopted by the brand owner. Companies should take into consideration the channels where the products are sold and what the requirements are. The following decision tree presents the choice of options for GTIN.

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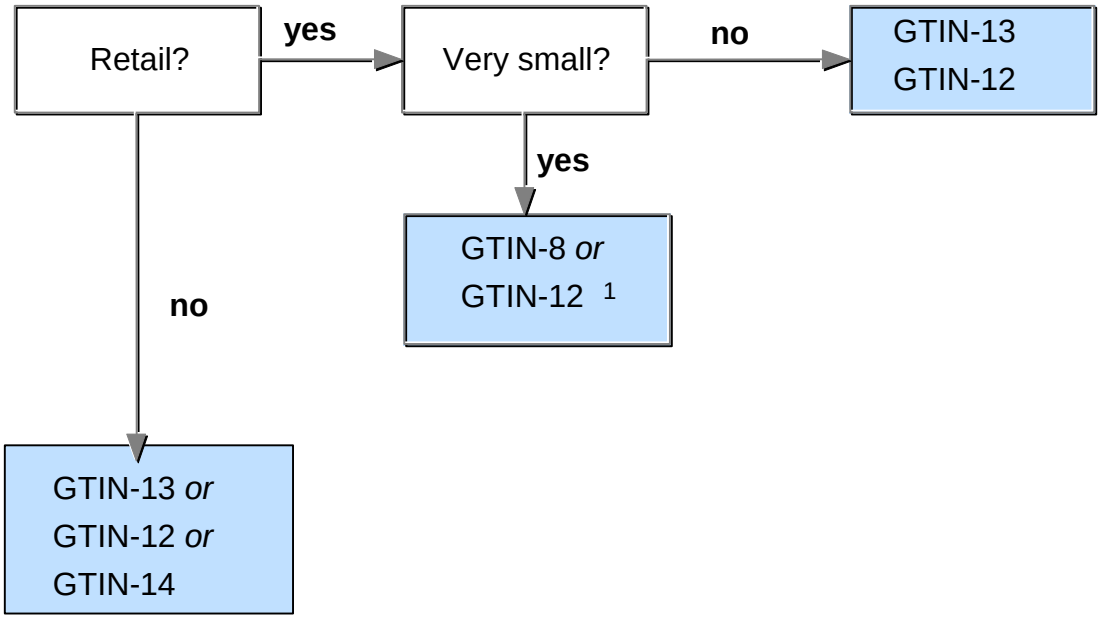

GTIN-13 : 5412345000013

GTIN-13 : 5412345000433

GTIN-13 : 5412345000693

GTIN-13 : 5412345000259

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- **The uses of the GTIN**

Whatever the country where the item is sold, its GTIN will remain valid. It is independent of prices and methods of supply.

The GTIN is the number which appears in catalogues, product sheets, price lists and on documents or messages exchanged for the transaction to take place (orders, despatch advice or delivery notes and invoices).

A GTIN can also be allocated to services that may be invoiced, such as transport or storage for the account of a customer, etc.

- **Pre-priced items**

Pre-pricing is discouraged as a trade practice as it introduces complexity for trade item file maintenance throughout the supply chain. If however, the price is marked on the item, the GTIN should be changed when the price marked on the item changes (except for variable measure items, where other rules apply – see Chapter 9).

3.4. WHAT IF THE LEGAL STATUS OF A BRAND OWNER CHANGES?

Although National, federal or local regulations may apply and take precedence over these rules, the guidelines below should be followed as long as they are compatible with the local laws.

Important note: If a company changes legal status, or the “ownership” of the GS1 Company Prefix changes, as the result of an acquisition or merger, the Member Organisation must be notified within one year.

- **Acquisition or merger**

The Member Organisation has to be notified of the acquisition or merger within one year. The rule for an acquisition or merger is that the merged company acquires the numbers of the old company.

Products that the acquired company produced under its GS1 Company Prefix can still be produced using the same prefix after the merger, since the acquiring company has control of the acquired company’s GS1 Company Prefix. If it so desires, the acquiring company can label all acquired products using their existing GS1 Company Prefix. The importance of ensuring trading partners are informed of any changes, in a timely manner, cannot be overemphasised.

- **Partial purchase**

If a company purchases a division of a company whose GS1 Company Prefix is used in divisions not purchased, then the acquiring company must change the GTINs for products in the purchased division, as well as any related GLNs, within one year.

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The rules concerning the use of the seller's GTINs, and other GS1 Identification Keys, should be taken into consideration when drawing up the purchase contract.

At the earliest opportunity, the buyer should phase in new numbers, from its own range of numbers, for items whose brand name it has acquired. The buyer will be able to do this, for example, when packaging is redesigned or reprinted.

- **Split or de-merger**

When a company splits into two or more separate companies it is necessary that the GS1 Company Prefix assigned to the original company be transferred to one, and only one, of the new companies. Any company left without a GS1 Company Prefix will need to apply to a Member Organisation to obtain a new one. The decision on which of the new companies should take the old or new GS1 Company Prefix should be made so as to minimise the number of changes to GTINs that will be required. The decision should be part of the legal arrangements that set up the new companies.

It is not necessary for existing stocks of items to be renumbered. However, when any of the de-merged companies has trade items that are numbered from a GS1 Company Prefix that it no longer holds, then it should renumber those items using its own GS1 Company Prefix when new labelling or packaging is produced. Customers should be notified well in advance of the changes.

De-merged companies that retain a GS1 Company Prefix must keep a record of the GTINs created from their prefix that have been allocated to items they no longer own. They must not reuse these GTINs for a period of at least four years after the company that split away who owns those items last supplied the goods identified by those GTINs. Therefore the company that did not retain the Company Prefix has to keep the company that did maintain the prefix informed. This is particularly important in regard to the dates on which the goods were last supplied with the original GTIN and they should guarantee a date by which the GTIN will be changed.

3.5. WHEN A GTIN CAN BE RE-USED?

GTINs allocated to trade items which have become obsolete must not be re-used for another trade item until at least 48 months have elapsed from the date the original trade item was last supplied to the customer. In the case of garments, the minimum period is reduced to 30 months.

A longer period may be needed depending upon the type of goods. For example steel beams may be stored for many years before entering the supply chain. Brand owners should consider what would be a reasonable period for the trade item to remain in the supply chain cycle before re-using GTINs.

Even if the product is no longer in the supply chain, its number may still be kept in databases for historic records.

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4. SMALL PRODUCTS

The allocation of GTIN-8 Identification Numbers is restricted to items that genuinely cannot accommodate an EAN-13 or UPC-A Bar Code and are assigned individually upon request.

Before deciding to use a GTIN-8 Identification Number, the user should first consider (usually jointly with their printer) all possible options for using a GTIN-13 Identification Number. These may include:

- Whether the symbol can be reduced in size, i.e. printed at a lower magnification, taking into account the minimum bar code print quality requirements.
- Whether the label can reasonably be changed (label means the total printed design surface, whether or not affixed separately). This would enable the printer's recommended size of standard EAN/UPC Symbol to be included. This could be achieved by redesigning the label, by increasing the label size, (especially where the existing label is small in comparison with the pack area) or by the use of an additional label.
- Whether a truncated symbol can be used. A truncated symbol (a symbol of normal length, but of reduced height) may only be used if there is absolutely no possibility of printing a symbol in full size. Truncation removes the symbol's omni-directional scanning capability. A symbol with excessive truncation will not be of any practical use. Users considering this option are advised to consult their customers to see if an acceptable compromise can be reached.

A GTIN-8 Number may only be used:

- If the EAN-13 Bar Code Symbol, in the size required as a result of print quality studies, exceeds either 25% of the largest side of the printed label area or 12.5% of the total printable area.
- If either the largest side of the printed label is less than 40 cm^2 or the total printable area is less than 80 cm^2.
- On cylindrical products with diameter less than 3 cm.

U.P.C. Company Prefixes beginning with zero can be used to construct GTINs that can be used in UPC-E Symbols for small products. Distribution of these Company Prefixes is restricted to demonstrated need only (e.g. for items whose packaging does not include enough available space to permit the use of another symbol). Companies with these prefixes are encouraged to manage their finite resources carefully.

Technical details of UPC-E representation of GTIN-12 Numbers are described in Appendix 2. Further details are available from www.gs1us.org.

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5. PROCESSING THE GTIN

5.1. THE CONTENT OF THE DATABASE

The GTIN is a unique identification number for a trade item. This uniqueness is achieved whichever of the four data structures described in Chapter 3.1 is used. These structures are to be stored in a 14-digit data field as shown below:

Data structures	**Global Trade Item Number (GTIN Format)**													
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	T_{13}	T_{14}
GTIN-14	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}
GTIN-13	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}
GTIN-12	0	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}
GTIN-8	0	0	0	0	0	0	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8

In cases where there are less than 14 numbers in a data structure e.g. GTIN-8, the numbers must be right justified in a 14-digit field and filled with zeros in the leftmost positions.

The GTIN is an access key to all data related to the particular trade item as it is identified, that is stored in the data files or in transaction messages.

Links have to be created between hierarchies of trade items. Such links are those between each unit and all the trade items within this particular unit. An example would be the links between a can of paint, a box of ten cans of paint, and a pallet of 24 boxes of ten cans of paint. This will enable customers to control their stock-keeping and ordering processes, and allow customers to compare sales at the check out with the number of units they have received or still have in stock.

5.2. TRANSMISSION OF PRODUCT INFORMATION

Transmission of information in regard to the item is a very important step in the relationship between supplier and customer, and all third parties.

This information is used in a wide range of processes in demand and supply chains. Most processes cannot be carried out correctly if the proper item information is not available, an example would be when a cashier scans an item but the cash register displays the message "'unknown item". However, there are many other processes such as ordering, invoicing and stockroom operations when it is essential to have the correct item information. Therefore, in addition to the flow of goods, there is a flow of information necessary between trading partners.

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Comprehensive information should be transmitted:

- Name of the supplier and the GLN of the company
- Date of application (date from which the trading partners may use the information)
- GTIN of the trade item
- A full product description for EDI messages or for the documents relating to the transaction and an abbreviated description for the point of sale
- The physical characteristics of the trade item including dimensions, net weight
- Description of the various standard groupings of the trade item, including the number of single trade items contained in larger trade units
- GTINs allocated to these items, in a 14 digit field
- Description of the pallet or the palletisation pattern
- The GTIN and the quantity of units of the lower level (if any).

5.3. How should the information be exchanged?

The preferred methods are EDI messages sent from the suppliers to all its customers or alternatively by way of a central electronic catalogue (data synchronisation).

If either of these methods are used the data should be structured in standard messages sent automatically.

If these alternatives are not possible, a floppy disk with standard messages could be used. If that is not an option, then a paper document containing the different characteristics and conditions of purchase of the product would suffice.

5.4. When should communication occur?

A number of actions are vital to ensure that GTINs are accurately communicated within the Supply Chain. These ensure that the data associated with any scanned bar code can be associated with accurate, up to date, data. This is particularly essential for items scanned at the Point of Sale where the absence of accurate data may have legal implications.

Trading partners should make an agreement about the appropriate time period within which the information will be communicated.

Communication about a GTIN is essential in cases listed below. In any situation, the information must be sent well ahead of time in order to give the trading partner a chance to process it.

1. New trade relationship. All the GTINs of products involved in a new trade relationship should be sent to the trading partner with the associated data.
2. New item in the assortment. The GTIN should be passed on as a matter of course during the first contact between the account manager and the buyer.
3. New GTIN allocated. If a change in the product demands a new number, the new GTIN must be notified immediately to the partner when they are being

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notified of the item change. The information must be given to the trading partner in ample time before the goods concerned are supplied.

4. Promotions with a different GTIN. Many retailers plan promotional special offers well in advance. The special offers are often preceded by a registration procedure, which makes it essential that the GTINs are notified well in advance. It is recommended that this should be done as early as possible when the initial contact relating to a special offer is being made.
5. Temporary *replacement* item with a different GTIN from the normal item. If for whatever reason, a manufacturer supplies an item with a different GTIN from the one expected by the trading partner, it is essential that the new GTIN is forwarded and entered into the database in time.
6. Rack jobbing (also known as vendor refill). It may be possible that a rack jobber restocks an item on the shelf that has a different GTIN, which has not yet been entered in the database. Rack jobbers should therefore always check whether the GTIN on the item is the same as that usually present on the shelf. If not, then the person responsible for the database in the store must be notified of the change.

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6. SYMBOL MARKING TRADE ITEMS

6.1. FEATURES OF BAR CODES

There are several ways to apply a bar code to an item:

- Integrating the bar code into the packaging design
- On-line direct printing onto packaging
- Affixing a pre-printed label

♦ Sizes

Bar codes can be printed in various sizes. The size to be selected, besides of the scanning environment, depends also on the printing conditions. A small bar code can be used if good quality printing is coupled with a good quality substrate. It is not possible to select an arbitrary symbol size to fit a predetermined space on the package.

For each type of bar code, the size may vary between a minimum size and a maximum size. For direct printing, it is determined by the printer after tests. Equipment that constructs bar codes from pixels or dots will not be able to produce bar codes in the full range of sizes.

Another factor that should always be taken into account when deciding about the bar code symbol size, should be the environment in which it is to be scanned. Symbols intended for retail applications may be as small as the print quality permits, whereas the bar codes for warehouse environment should be as large as it is necessary to allow scanning from a considerable distance, i.e. by an operator of a truck.

Prior to 1999, the size of a bar code in GS1 System had been expressed as a Magnification Factor (multiplication of a theoretical, ideal width and height values). It assumed a fixed ratio between the X-dimension of a symbol (its narrowest element) and its height, which did not hold true for some symbologies.

For this reason, the Magnification Factor term was removed from the *GS1 General Specifications* and the bar code size has been defined by setting the minimum, target & maximum X-dimension for each symbology, depending on the application in which the given symbol is to be used. The minimum symbol height must be respected. It should be noted, however, that increased symbol height results in improved scanning rates. The sizes for all GS1 endorsed symbologies are defined in *GS1 General Specifications*, Section 5.4 GS1 System Symbol Specification Tables.

However, as a legacy after the previous specification, a lot of printing devices producing GS1 bar code symbols still use the Magnification Factor for specifying the size of a symbol. Therefore, in Chapter 6.2, presenting the GS1 endorsed symbologies, the Magnification Factor method is still used, along with minimum and maximum size of each bar code (including min. and max. height).

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♦ Quiet Zones

All types of bar codes must have Quiet Zones, before the first bar and after the last bar.

This Quiet Zone is extremely important and must be respected. The size of the Quiet Zone area varies depending on the symbol size and type of the bar code. Any print within Quiet Zones can prevent the reading of the bar code symbol.

♦ Colours and contrast

Scanners work by measuring reflectance. There must be sufficient contrast between dark bars and light spaces. There must be sufficient density of ink in the bars not to create voids.

Scanners use a beam of red light. A contrast that seems to be satisfactory for human eyes may be insufficient for scanners.

Bar codes can be printed in various colours. A general indication is that light colours including red and orange are suitable for the light bars (spaces) and quiet zones. Dark colours including black, blue, and green are suitable for the bars. Composite colours are not adequate to print bar codes. It is best to use solid colours.

High-gloss substrates may change the reflectance and checks must be made before printing. Transparent over-wraps may also reduce contrast and checks on the completed package should be made if over-wrapping is used.

♦ Print quality

The printing conditions must be checked regularly throughout the print run to ensure they have not deteriorated since the initial assessment was made. There are various means to assess the quality of a bar code. Your GS1 Member Organisation can advise you on this point. Simple visual ways can be used. An example is the printing of an H of given dimensions inside the bearer bar of an ITF-14.

When determining which orientation to print the bar code, the print process involved should be taken into account. For example, when using a flexographic process, it is essential to print the bar code in the print direction because of the ink "spread" associated with this printing process. When using a lithography process, spread is usually insignificant. In all cases the printer should be consulted.

For more information on print quality see the *GS1 General Specifications* and the brochure “*GS1 Bar Code Verification for Linear Symbols*”.

♦ Symbol placement guidelines

Productivity and scanning accuracy improve considerably when the bar code location is predictable. Consistency in the location of the bar code achieves maximum productivity in any scanning environment.

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(1) Symbol placement guidelines for retail items

The bar code, including the human readable digits underneath (identification number) must be visible and free of any obstacles preventing it from scanning.

Never allow two bar codes encoding different GTINs to be visible on a package. This is particularly relevant to multi-packs, especially those with clear wrapping. Therefore, multi-packs must carry a separate GTIN, with all internal bar codes obscured.

If the item is **random wrapped**, the same bar code can be printed more than once on the wrapping. This ensures that one complete bar code is always visible.

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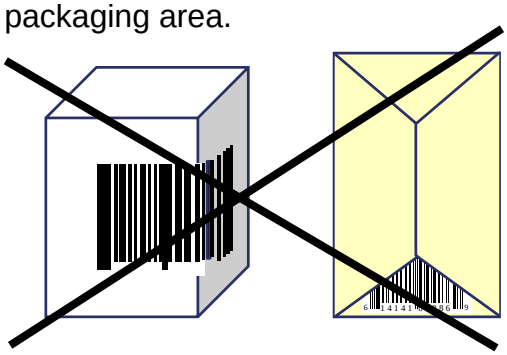
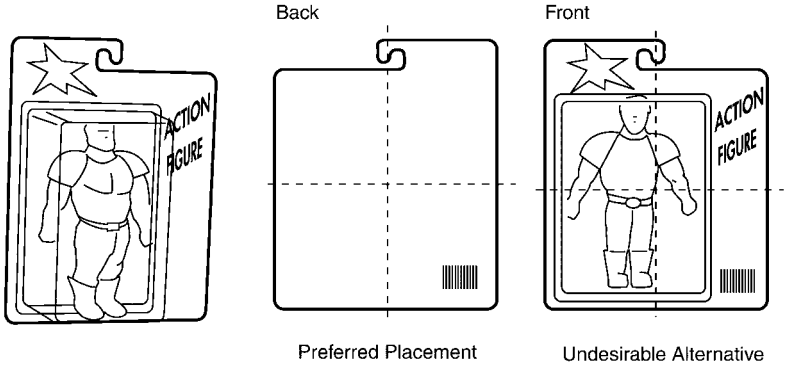
Scanning is most successful when the bar code is printed on a reasonably **smooth** surface. Avoid printing around the corners or on folds, creases, seams, and any other uneven packaging area.



Sometimes the **irregular shape** of packaging prevents the bar code from flat (parallel) contact with the scanning surface of slot scanners. This applies in particular to carded, blister-packed, or concave items.



On cylindrical products, where the printing direction allows, it is generally desirable that the bars are perpendicular to the axis of the cylinder (ladder style), so that a scan line can pass through the symbol on as near a flat plane as possible. This caters for the problems associated with curves on items such as cans and bottles. The ladder orientation is imperative for curved surfaces with a small radius.

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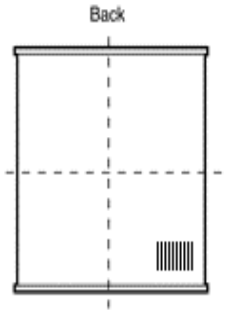
The preferred placement for a bar code is on the lower right quadrant of the back, respecting the proper Quiet Zone areas around the bar code symbol and the edge rule. The alternative is on the lower quadrant of another side of the container.



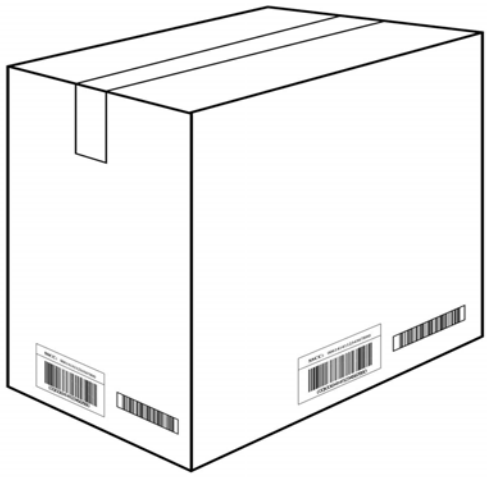
Edge rule: The bar code symbol must not be closer than 8 mm or farther than 100 mm from any edge of the package / container.

(2) Symbol placement guidelines on non-retail items

The minimum requirement is to place at least one bar code symbol on each trade item or logistics unit. However, the best practice is to fix two labels to adjacent sides of items packaged for transport.

- **(a) On cartons and outer cases**

The lower edge of bar should be located 32 mm from the natural base of the item. Including Quiet Zones, the symbol should be at least 19 mm from the vertical edges. When using an ITF-14 Bar Code, the outer edges of the bar code's left or right bearer bar should be a minimum of 19 mm from the vertical edges of the side of the item.



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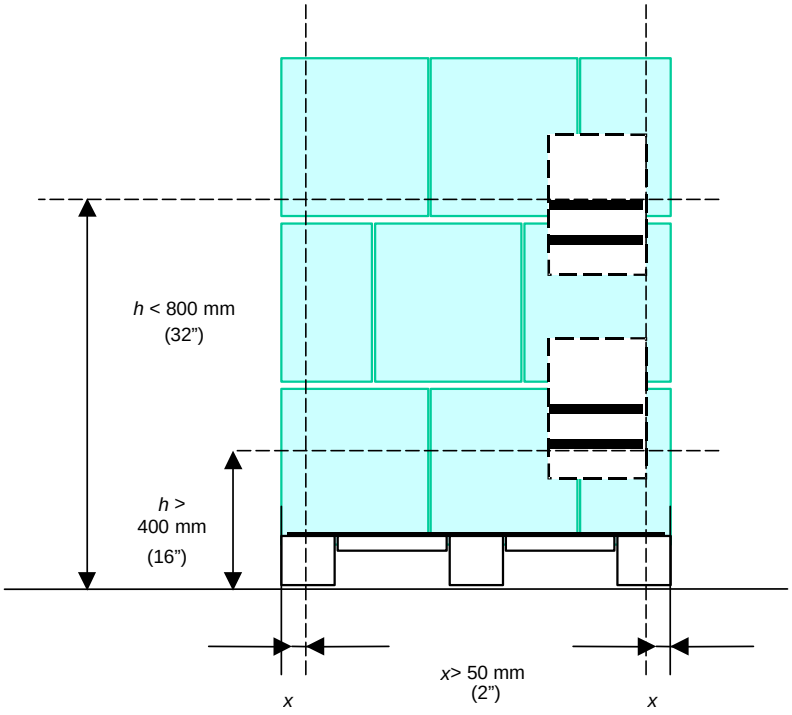
- **(b) On pallets**

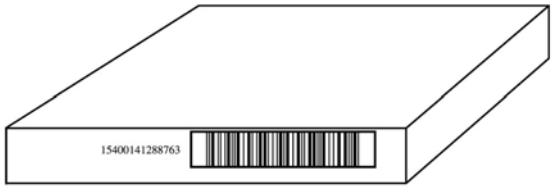
For pallets labels should be placed so that all the bar code symbols are at a height of between 400 mm and 800 mm from the base of the unit, and no closer than 50 mm from the vertical edge.



- **(c) On shallow trays and cases**

If the height of a case or tray is less than 50 mm and printing a full height bar code with the human readable interpretation below the bars is impossible, or if the construction of the unit prevents accommodation of the full symbol height, the following options should be considered in this order of preference:

1. Place the Human Readable Interpretation to the left of the symbol, outside the compulsory Quiet Zones.



2. When the height of the unit is less than 32 mm, the symbol may be placed on the top of the package. The symbol should be placed with the bars perpendicular to the shortest side, no closer than 19 mm from any edge.

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6.2. BAR CODE TYPES USED IN GS1 SYSTEM

♦ EAN/UPC Symbols

Trade items that are sold through retail outlets must be bar coded with one of the EAN/UPC Symbols: EAN-13, UPC-A or EAN-8 or UPC-E. These symbols may also be used for trade items not for retail sale.

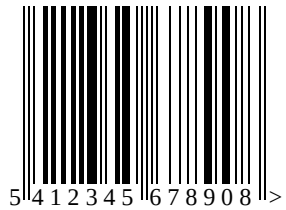
If printing conditions and/or the quality of substrate are not adequate to print the bar code symbol directly on the package, the symbol may be printed on a label affixed to it.

The following bar code symbols are shown here in nominal dimensions (magnification factor 100%), including Quiet Zones. The minimum and maximum sizes are given for each type of bar code. See Appendix 3 for a detailed table of dimensions of EAN/UPC Symbols.

EAN-8 Symbol

Min. size: 21.38 mm x 17 mm
Max. size: 53.46 mm x 43 mm
Nominal dimensions: 26.73 mm x 21 mm
X-dimension[1] at nominal size: 0.330 mm
NOTE: Bar code height has been rounded.

EAN-13 Symbol



Min. size: 29.83 mm x 21 mm
Max. size: 74.58 mm x 52 mm
Nominal dimensions: 37.29 mm x 26 mm
X-dimension at nominal size: 0.330 mm
NOTE: Bar code height has been rounded.

[1] The X-dimension is the specified width of the narrow element in a bar code symbol. This width varies from one symbology to another.

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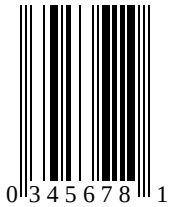
UPC-A Symbol

Min. size: 29.83 mm x 21 mm
Max. size: 74.58 mm x 52 mm
Nominal dimensions: 37.29 mm x 26 mm
X-dimension at nominal size: 0.330 mm
NOTE: Bar code height has been rounded.

UPC-E Symbol



Min. size: 17.69 mm x 21 mm
Max. size: 44.22 mm x 52 mm
Nominal dimensions: 22.11 mm x 26 mm
X-dimension at nominal size: 0.330 mm
NOTE: Bar code height has been rounded.

Based on their nominal dimensions, the EAN/UPC Symbols can be printed with a magnification factor ranging from 80% to 200%. If the symbol is intended for conveyorised scanning, a minimum magnification factor of 150% should be used.

The symbol is designed to be read omni-directionally.

Truncation, (reducing the height of the symbol) removes the omni-directional capability. Truncation should be a last resort when there is only space for a truncated bar code.

A useful device to help maintain the Quiet Zone in some production processes is to include a “less than” (<) and/or “greater than” (>) characters in the human readable field aligned with the edge of the Quiet Zone. Those marks are referred to as the “Quiet Zone Indicators”.

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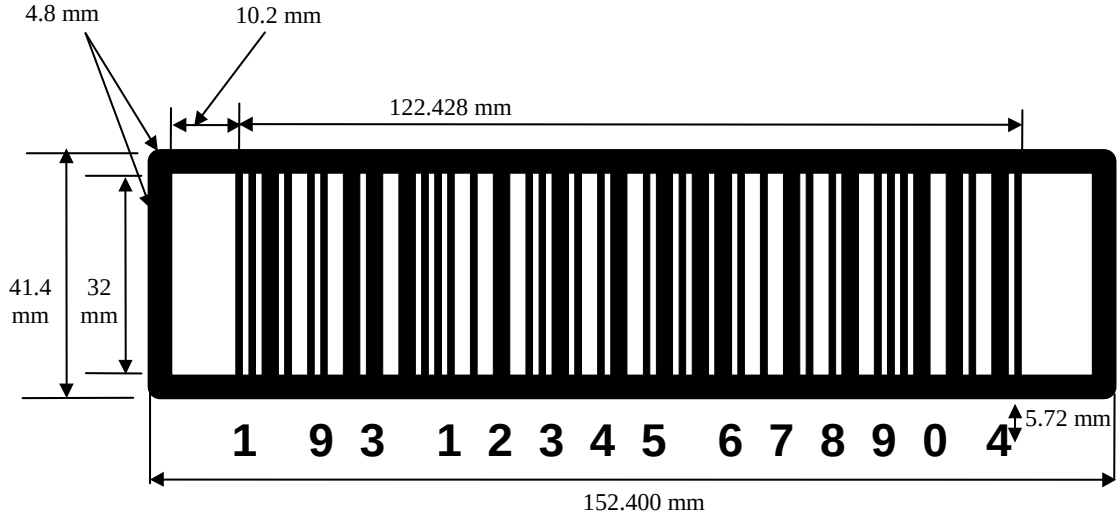
- **ITF-14 Symbol**

For companies wishing to print the bar code directly on the carton, particularly on corrugated cardboard, the ITF-14 Symbol is more suitable because the printing requirements are less demanding. Pre-printing or direct print by thermal transfer or ink-jet may be possible.



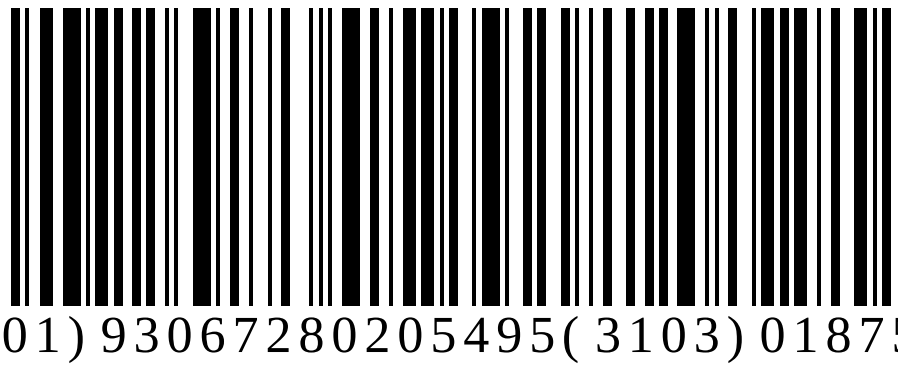
This diagram is not intended for use as a basis for measurement.

Dimensions below do not include the bearer bar.

Min. size (50%): 71.40 mm x 12.70 mm
Max. size (100%): 142.75 mm x 32.00 mm
Nominal dimensions: 142.75 mm x 32.00 mm
x-dimension at nominal size: 1.016 mm

To ensure efficient reading in any environment, including conveyorised scanning, ITF-14 symbols should be printed close to 100% magnification, with a minimum of 50%.

- **GS1-128 Symbol:**



The GS1-128 is of variable length, depending on the number of characters translated, the types of character encoded and the X-dimension (resulting in overall symbol size) achieved. For a given length of data, the symbol size is

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variable between limits, to accommodate the ranges in quality achievable by the various printing processes. The symbol is designed to be read bi-directionally by fixed or portable scanners.

Based on their nominal dimensions (X-dimension: 1 mm), the GS1-128 Symbols can be printed with a magnification factor ranging from 25% to 100%. To ensure efficient reading in any environment, including conveyorised scanning, a minimum magnification factor of 50% should be used.

6.3. CONSIDERATIONS ON THE USE OF THE SYMBOLOGIES

The GS1-128 Symbology can be used to encode data beyond the GTIN.

If, for any reason, there is a need to print additional information besides the GTIN (serial number, etc…), and the trade unit is already marked with a GTIN encoded in an EAN-13, ITF-14, or GS1-128 with Application Identifier (01) Symbol, then it is possible either:

- To apply a label with the additional information in a GS1-128 Symbol in addition to the previously marked symbol. All the symbols should then be horizontally aligned.

- To apply a label covering the existing symbols. The GTIN represented in the original symbol must then be printed on the label, with the other chosen attribute data, preferably using a concatenated GS1-128 symbol.

6.4. CHOOSING BETWEEN BAR CODES

Numbering items and the physical application of the bar code are two separate operations. It is quite usual that different companies carry them out at separate sites. The source – the brand name holder – usually assigns the number to the item and the manufacturer applies it to the packaging.

It is also possible to number an item without applying a bar code. This could occur when it is virtually impossible to apply a bar code, for example on a very small cosmetic, or on a unit of electricity, a load of sand etc. It would then be possible to use the number, for example in electronic data interchange (EDI) messages.

Users should take the following considerations into account when choosing between the different symbologies:

- Space available on the item to be bar coded
- Type of information to be bar coded; GTIN only or GTIN and additional information (attributes)
- Operational environment in which the bar code symbol is to be scanned; retail point of sale or general distribution (e.g. in a warehouse racking)

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Various GS1 identification numbers can be represented in specific bar code symbols:

Number		Can be represented with symbols
GTIN-8	→	EAN-8 ITF-14* GS1-128* *After adding Indicator digit and 5 filling zeros. The GTIN-8 number assigned to small retail items (see Chapter 4) can be used to create GTIN-14 for uniform groupings (indicator digit values 1-8). However, for mixed groupings new GTINs must be assigned, as they are very unlikely to be so small as to justify assigning a new GTIN-8 number.
GTIN-12	→	UPC-E* UPC-A ITF-14 *Certain numbers only, (see Chapter 4).
GTIN-13	→	EAN-13 ITF-14 GS1-128
GTIN-14	→	ITF-14 GS1-128

Certain symbols can be used only to mark some types of items, i.e.:

Small retail items	General retail items	Non-retail items
EAN-8	UPC-A	ITF-14
UPC-E	EAN-13	GS1-128

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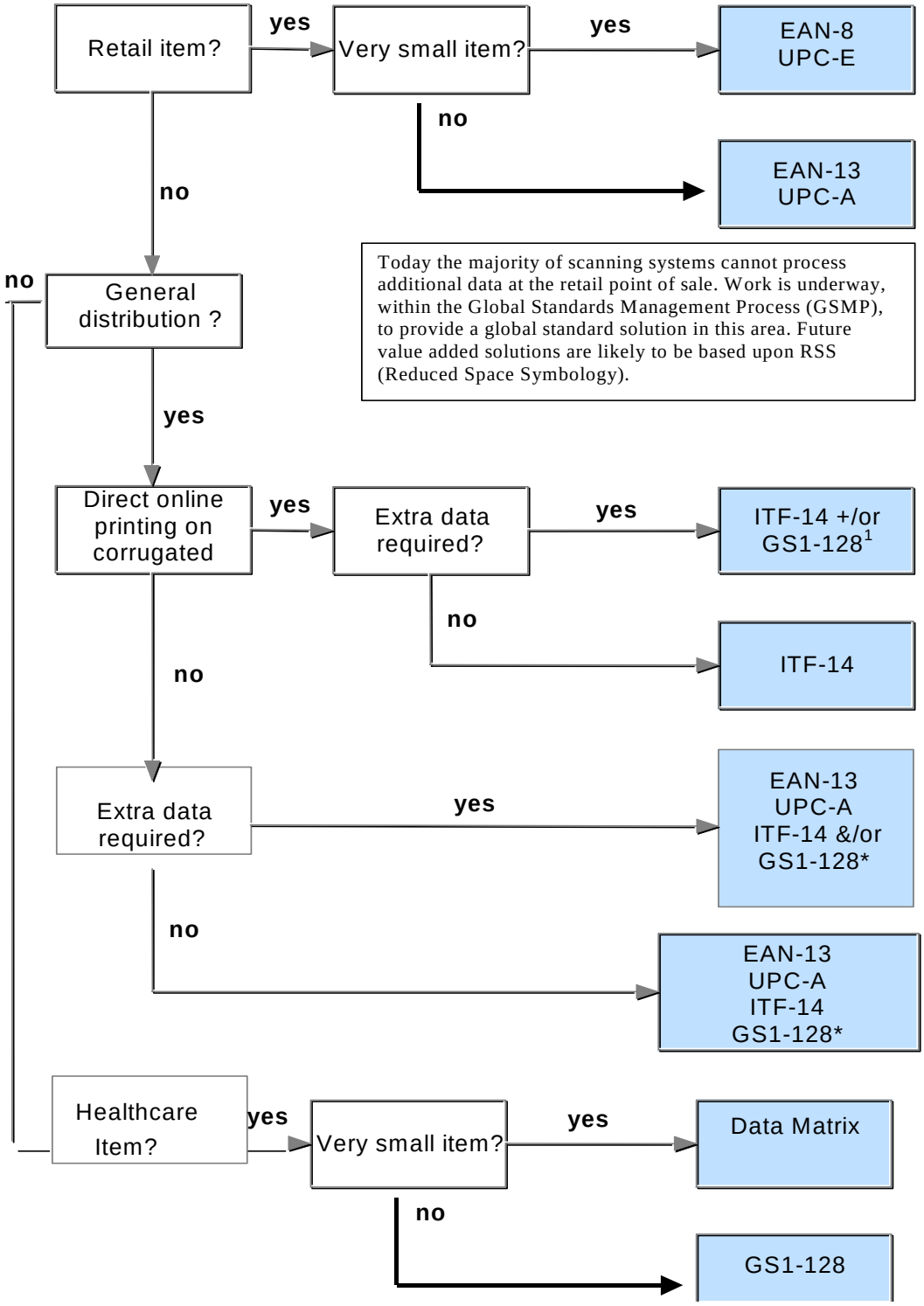
The following diagram will help users to choose between options.



[1] Quality issue when printing GS1-128 on corrugated.
* GS1-128 can encode additional data to the GTIN as well as the GTIN itself.

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7. APPLICATION IDENTIFIERS (AIs)

GS1-128 is an extremely flexible symbology. It allows representation of data of variable length and makes it possible to encode several pieces of information in one bar code symbol. This is called concatenation.

An Application Identifier is the field of two or more characters at the beginning of an Element String. AIs are prefixes that uniquely identify the meaning and the format of the data field following the AI.

The data following the AI may comprise alphabetic and/or numeric characters, of any length up to thirty characters. The data fields are either of fixed or variable length, depending on the AI.

Attribute data are associated with a trade item or a logistic unit and have no meaning if isolated. Attribute data may be represented in GS1-128 using AIs. There is a range of AIs for attributes such as weight, area or volume. The measure attributes that can be used on trade items are called trade measures (these are always net measures) and attributes for Logistic Units are called logistics measures (these are always gross measures).

The following table is extracted from the complete list (see Appendix 4 for the complete list of Application Identifiers).

AI	Content	Format*
00	SSCC	n2+ n18
01	Global Trade Item Number	n2+ n14
02	GTIN of trade items contained in a logistic unit	n2+ n14
10	Batch number	n2+ an..20
11	Production date	n2+ n6
15	Best Before Date (YYMMDD)	n2+ n6
17	Expiration Date (YYMMDD)	n2+ n6
21	Serial number	n2+ an..20
310X**	Net weight (kilograms)	n4+ n6
37	Count of trade items contained in a logistic unit	n2+ n..8
401	Consignment number	n3+ an..30
420	Ship to (deliver to) postal code	n3+ an..20

* The format symbols denote:
  n = numeric characters
  an = alpha-numeric characters
  .. = variable length field
  figures = number of characters

** X indicates the position of a decimal point

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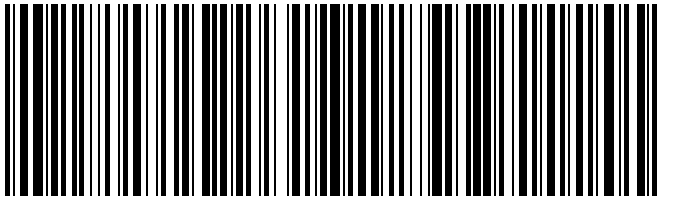

Example of a GS1-128 representing a GTIN, a sell by date and a batch number

The use of AIs is governed by certain rules. Some must always be used with others: for example AI (02) must be followed by AI (37). Some AIs must never be used together, for example AI (01) and AI (02). Companies are not free to pick as they wish from the list of AIs and must respect these basic rules which are fully explained in the *GS1 General Specifications*.

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8. LOGISTIC UNITS

A Logistic Unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain.

Tracking and tracing of Logistic Units in the supply chain is a major application of the GS1 System. For this purpose, a standard Identification Number known as the SSCC identifies Logistic Units.

This number is unique to each specific Logistic Unit, and is, in principle, sufficient for all logistic applications.

If trading partners, including carriers and third parties, all read SSCCs, exchange EDI messages between them that give full descriptions of the Logistic Units and have the relevant file on-line when reading the SSCC to access these descriptions, then no other information would be needed besides the SSCC.

But all these conditions are still rarely met, so it is recognised that a few attributes in addition to the SSCC are useful in bar coded form on the logistic units.

As each Logistic Unit **must** be assigned its own unique SSCC, the pre-printing of the bar code symbol containing the SSCC on the packaging of the Logistic Unit is not practical. A label must be created, which will be attached to the Logistic Unit, at the time that it is generated.

Further, a Logistic Unit may also be a unit of trade and hence be subject to the GS1 specifications for "Trade Items". If this is the case, it is logical to generate a single label containing all the bar-coded information required.

GS1 Global Office along with representatives of manufacturers, retailers, transporters and GS1 Member Organisations have developed a voluntary standard for bar code label applications: the GS1 logistics label. The SSCC, and its application on Logistic Units, is the most important element of the GS1 logistics label.

8.1. THE SSCC

SSCC identifies all Logistic Units, whether they are homogeneous or mixed.

A company wishing to differentiate its production plants within the SSCC can do so by allocating blocks of SSCCs to each production plant.

The SSCC is declared in the despatch advice or the delivery note and in all transportation messages.

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Application Identifier	SSCC		
	Extension digit	GS1 Company Prefix Serial Reference	Check Digit
0 0	N_1	N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11} N_{12} N_{13} N_{14} N_{15} N_{16} N_{17}	N_{18}

The **Extension digit** is used to increase the capacity of the SSCC. It is assigned by the company that allocates the SSCC.

The **GS1 Company Prefix** is assigned by a GS1 Member Organisation to the system user which is normally the company assembling the Logistic Unit. It makes the number unique world-wide but does not identify the origin of the unit.

The **Item Reference** is a serial number that the company that has been assigned the GS1 Company Prefix chooses to complete the string of digits N_2 to $N_{17.}$ The simplest way to allocate the Item Reference is sequentially that is 000, 001, 002, 003...

The local structure of GS1 Company Prefixes and Item References, to be completed by each Member Organisation.

8.2. THE LOGISTICS LABEL

♦ Representation of information

The information presented on logistics labels takes two basic forms; human oriented information to be read by people, which is comprised of text and graphics; machine-readable information designed for automatic data capture. Bar codes, as machine-readable symbols, are a secure and efficient method for conveying structured data. They, as well as human readable text allow general access to basic information at any point in the supply chain. Both methods of presenting information add value to logistics labels, and often co-exist on the same label. The GS1 logistics label is structured in three sections. The top section of the label contains free format information. The middle section contains text information and human readable interpretations of the bar codes. The bottom section includes the bar codes and associated information.

♦ Label Design

The layout of the logistics label supports the supply chain process by grouping information into three logical sections for the supplier, customer, and carrier. Each label section may be applied at a different point in time as the relevant information becomes known. Additionally, within each section bar codes are segregated from text information to facilitate separate processing by machines and people.

The labeller, which is the organisation responsible for the printing and application of the label, determines the content, format, and dimensions of the label.

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The SSCC is the single mandatory element for all GS1 logistics labels. Other information may be added, when required, in order to comply with the *GS1 General Specifications*.

A section is a logical grouping of information that is generally known at a particular time. There are three label sections each representing a group of information. Generally, the order of the sections, from top to bottom, is: carrier, customer, and supplier. However, this order and top/down alignment may vary depending on the size of the Logistic Unit and business process being served.

(1) Supplier section

Information contained in this section is generally known at the time of packaging by the supplier. The mandatory SSCC is applied here as the unit identifier. Trade item identification (GTIN) would also be applied here when used.

Other information that may be of primary interest to the supplier, but might also be useful for customers and carriers, can be applied. This includes product related information such as product variant; dates such as production, packaging, expiration, and best-before dates; as well as lot, batch and serial numbers.

(2) Customer section

Information contained in this section is generally known at the time of order and order processing by the supplier. Typical information includes the ship-to-location, purchase order number, and customer-specific routing and handling information.

(3) Carrier section

Information contained in this section is generally known at the time of shipment, and is typically related to transport. Typical information includes ship-to postal codes, consignment numbers, and carrier-specific routing and handling information.

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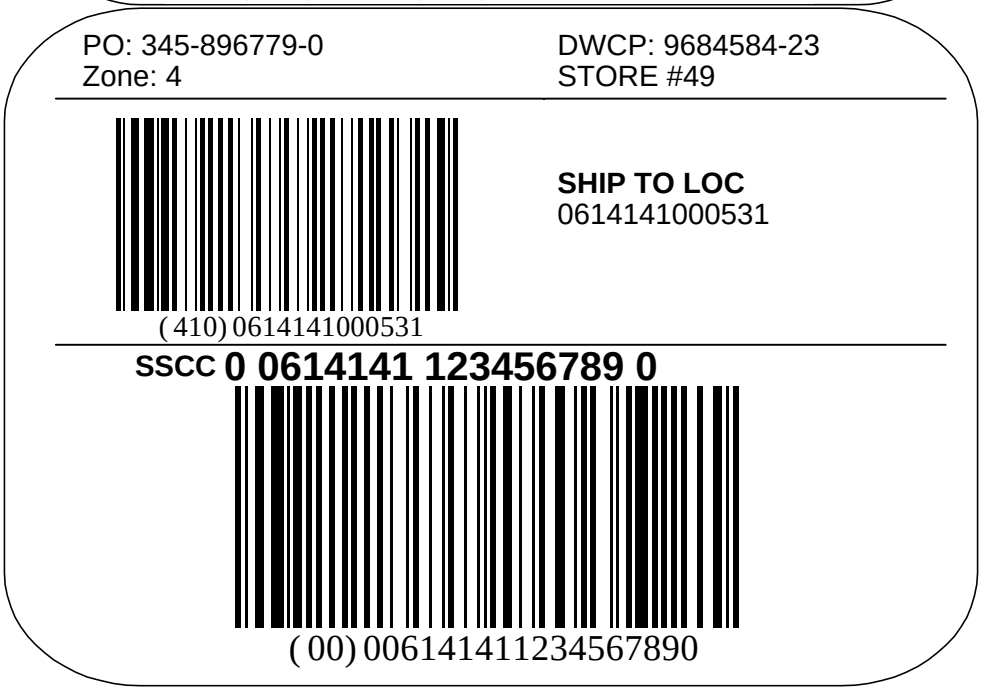
(4) Label examples

The basic label: an SSCC



A label with supplier, customer, and carrier sections

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9. VARIABLE MEASURE TRADE ITEMS

The term “Variable Measure Trade Items” is used to describe products that are sold, ordered or produced in quantities which can vary continuously, such as fruit and vegetables, meat, cheese, rope, chain, fabric, carpets on a roll, etc.

9.1. RETAIL VARIABLE MEASURE TRADE ITEMS

In this scenario the weight, quantity or price must be included in the bar code to be read at the check out. In the EAN/UPC Symbols, there is no room left for a GTIN, so a shorter number must be used to identify the product.

The measure or price may be of 4 or 5 digits, depending on the currency, and may include a special Verifier Digit for price. The exact structure is determined by the GS1 Member Organisation for their respective territories.

The short number may be allocated by:

- The retailer (from the capacity made available by MO)
- The supplier from a range of numbers allocated to him by the GS1 Member Organisation
- The GS1 Member Organisation in case a national generic number has been defined for a particular type of item.

The GS1 Prefix is selected by the Member Organisation from the range 02 and 20 to 29.

To be written by each Member Organisation.

The solutions for bar coding variable measure products are national solutions. They are not to be used when trading across borders. Companies which export must adopt the solutions in force in the country of destination: details are available at the respective GS1 Member Organisation.

9.2. NON RETAIL VARIABLE MEASURE TRADE ITEMS

The GTIN-14 Identification Number with the indicator "9" is used to identify a non-retail Variable Measure Trade Item. To complete the identification of a trade item the presence of the specific measure of the item is mandatory.

When several non retail Variable Measure Trade Items exist for a specific retail Variable Measure Trade Item, each one must be allocated its own GTIN starting with a 9.

The following is an example of a complete identification number in bar coded form, configured for measuring an item in kilograms. For other measures, see the full list of AIs in Appendix 4 of this document or consult the *GS1 General Specifications*.

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AI	GTIN	AI	Measure
0 1	9 N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11} N_{12} C	3 1 0 X	M_1 M_2 M_3 M_4 M_5 M_6

There are two ways to translate this information into a bar code.

- Preferably with a GS1-128, to encode the identification number and the measure in a single symbol, using Application Identifier (01) for the GTIN, and one of the AIs from (3100) to (3169), or AI (8001) for the measure.
- Or it is possible to have the GTIN encoded in an ITF-14 Symbol and the measure in a GS1-128 Symbol.

The measure is always expressed in six digits in the unit of measure defined by the AI. The position of the decimal point is indicated by the last digit (*x) of the AI. If it has the value 0 it means that there is no decimal point, if it has the value 2 it means that there are two decimal digits.

For example, 005250 preceded by the AI (3103) signifies 5,25 kilograms.

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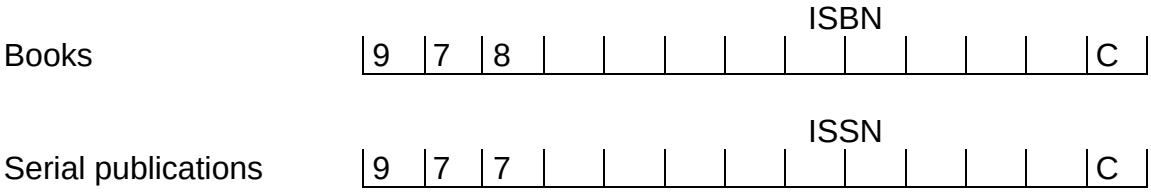
10. SPECIAL CASES

♦ Books, serial publications and printed sheet music

Two options are available when books, printed music or serial publications are being numbered.

- The GTIN-13 or GTIN-12 data structure can be used in a similar way to any other trade item. Please contact a local Member Organisation.
- The alternative is to use ISBN, ISMN or ISSN numbers (without its Check Digit) which are embedded in a GTIN.



The prefix 978 has been allocated to encode the ISBN. Prefix 979 has been allocated to ISBN and is being used for printed sheet music (ISMN). The prefix 977 has been allocated to encode the ISSN. Other solutions have been defined in some countries using a specific GS1 Company Prefix.

Additional information to the title can be printed in a number with two or five digits, to be shown in an additional symbol, called an “add-on” and located to the right of the EAN/UPC symbol and parallel to it. It is the responsibility of the publisher to issue add-on barcodes and they are used for book-returns purposes.

♦ Company internal numbering in a store or warehouse

Companies may need to number items for their own internal use. They may do this using GTIN-13 Numbers starting with one of the prefixes reserved for this purpose by the MO in the range: 02, 04, or 20 to 29. These numbers cannot be used outside the company that has allocated them and can only be used for scanning internally. They cannot be used for EDI purposes, as they are not allocated uniquely to the supplier. The use of internal numbering may cause confusion in the event of mergers between companies.

♦ The numbering of coupons

Coupon identification is organised at national level and therefore, the numbers cannot be used world-wide. The structure is defined by each MO.

Coupons are numbered using a GTIN-13 Number starting with prefix 99. For U.P.C. Symbols, GS1 US has allocated prefix 05 and 99 to coupons. Prefixes 981 and 982 have been released for coupons issued in a currency common to several countries (e.g. euro).

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To be written by each Member Organisation. There are different national solutions for identifying coupons, in a similar way that there are national solutions for variable measure items

- **Other special solutions**

To be written by each Member Organisation. There are local solutions for other areas of applications i.e. for identification of payment slips, pharmaceutical products etc. Each Member Organisation that has developed such local solutions should present them at the necessary level of detail.

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11. GLOBAL LOCATION NUMBERS

The Global Location Number (GLN) makes possible the unique and unambiguous identification of physical locations or legal entities.

A trade relationship may involve several companies; suppliers, customers and possibly a logistic service provider. In each company, several departments may be involved.

Trade partners need to identify in their own files, all the locations that are relevant to this relationship.

The GLN uses the same data structure as the GTIN-13 data structure and the numbers are non-significant. The same GTIN-13 Identification Number can be allocated to a product and to a location. No confusion arises because the applications are totally separate.

Each company or organisation holding a GS1 Company Prefix may assign Global Location Numbers to its own locations. Each different location that needs to be distinguished must be allocated a separate number.

WARNING!
In some countries GTIN and GLN numbers are allocated from separate pools – different numbers for each of them. Therefore, in order to avoid confusion and number clash, it is strongly advised to always contact your GS1 Member Organisation before assigning GLNs.

It is the responsibility of a company using GLNs to keep business partners informed of all the numbers it has issued, together with the corresponding details.

The GLN can be used in many ways. For example in EDI communications the GLN can be used to identify all relevant physical locations and in bar coded form with Application Identifiers that have been defined for GLNs:

- "Deliver to" location AI (410)
- "Invoice to" location AI (411)
- "Purchased from" location AI (412)
- "Ship for - Deliver for - Forward to" location AI (413)
- Physical Location AI (414)
- Location Number of the Invoicing Party AI (415)

The web-site www.gs1.org/glnrules provides more details on GLN.

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12. Electronic Data Interchange

Every day, businesses generate and process a staggering volume of paper documents. These documents, ranging from purchase orders and invoices, to product catalogues and sales reports, provide the vital information that will precede, accompany or follow the physical goods in a commercial transaction.

Electronic Data Interchange (EDI) provides trading partners with an efficient business tool for the automatic transmission of commercial data from one computer application directly to another. In EDI, all paper business documents sent previously between companies have been replaced by messages, suitable for exchange by electronic means, between computer applications.

EDI is the transfer of structured data by agreed message standards, from one computer application to another by electronic means and with a minimum of human intervention.

This interchange concerns trade transactions, and the associated commercial, logistics and financial implications. For every organisation the successful implementation of EDI will be a multi-disciplinary project requiring a high level of commitment not only from senior management but also from a broad spectrum of functional managers responsible for different areas of activity. Corporate policies and procedures will need to be examined. Current functional procedures may require revision and new business relationships could be established and managed. At the centre of the system lies the better use and sharing of information, both internally and between trading partners, so that inter-dependency can be more informed and reliable.

There are two major areas in which the EDI is standardised in GS1 System: EANCOM® and XML.

EANCOM® is a detailed implementation guideline of the UN/EDIFACT standard messages. It comprises business messages with clear definitions and explanations on how to use all the data fields. This allows trading partners to exchange commercial documents in a simple, accurate and cost effective manner.

There are various types of messages to answer all business requirements at the various stages of a trade relationship:

- Master data messages describe relevant parties and products.
- Commercial transactions start with the ordering and end with the debit multiple advice or a credit multiple advice messages, following the logical sequence of the trading cycle.
- Report and planning messages are used for informing the trading partner on the trading activity or to plan ahead for future requirements, thus allowing a streamlining of the supply chain.
- General messages which are used to send general application support information to one or multiple addresses.

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EANCOM® is not only a set of standard messages; it is also based on the use of GS1 international numbers rather than numbers agreed bilaterally between two trading partners. The use of GS1 Identification keys will naturally simplify implementations with future trading partners.

The GTIN described in this manual for identifying trade items is the only international and multi-sector numbering system that provides a unique and unambiguous identification number for every item and its variants, regardless of its place of origin and destination. Its use in EANCOM® messages is particularly important in open environments. Companies do not have to maintain complex cross-references of trading partner's internal numbers.

The GLN (Global Location Number) provides the most efficient means of communicating location or company identification. As well as being used in the EANCOM® messages they can also be used by networks to route EDI messages to the designated mailbox, workstation or application.

EANCOM® messages have been designed to take full advantage of the associated standards, such as product and location numbering and bar coding, in order to provide maximum efficiency and benefits to the user. The use of such messaging and standards is increasing throughout the world.

The EDI performed by means of EANCOM® messages requires using specially dedicated connections – Value Added Network. VANs are very reliable, yet quite expensive and require special service. That is the reason why mainly it was the biggest companies that were able to invest in such infrastructure. The SMEs continued using the old paper-based and error prone exchange of business documents.

Along with the rapid development of the Internet, enterprises expressed the need to use this medium also for exchange of business documents. A response to that need was XML – eXtensible Mark-up Language, used for automatic exchange of business information between applications, over the Internet.

There have been several standard XML messages developed by GS1. All of them use the standard reference numbers, like GTIN or GLN. For further information about those new standards, interested users should contact their local GS1 Member Organisation.

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13. FREQUENTLY ASKED QUESTIONS

Detailed information can be found either at the website: www.gs1.org, or by contacting the local GS1 Member Organisation (the contact list can be accessed via:

www.gs1.org/contact

The frequently asked questions are posted at:

www.gs1.org/helpdesk

Detailed information about GTIN allocation rules are posted at:

www.gs1.org/gtinrules

Detailed information about GLN allocation rules are posted at:

www.gs1.org/glnrules

Contact information about member companies holding a given GS1 Identification Key (GTIN, GLN, etc.) can be looked up at:

www.gepir.org

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14. GLOSSARY

Add-On Symbol	A bar code symbol used to encode information supplementary to that in the main bar code symbol.
alphanumeric (an)	Describes a character set that contains alphabetic characters (letters), numeric digits (numbers), and other characters, such as punctuation marks.
Application Identifier	The field of two or more characters at the beginning of an Element String that uniquely defines its format and meaning.
Attribute	A piece of information reflecting a characteristic related to an identification number (e.g., Global Trade Item Number™ (GTIN™), SSCC).
Bearer Bars	Bars surrounding a bar code symbol to prevent misreads or to improve print quality of the bar code symbol.
brand owner	The party that is responsible for allocating GS1 System numbering and bar code symbols on a given trade item. The administrator of a GS1 Company Prefix.
carrier	The party that provides freight transportation services or a physical or electronic mechanism that carries data.
Check Digit	A digit calculated from the other digits of an Element String, used to check that the data has been correctly composed. (See GS1 Check Digit Calculation.)
Company Number	A component of the GS1 Company Prefix. GS1 Member Organisations assign GS1 Company Prefixes to entities that administer the allocation of GS1 System identification numbers. These entities may be, for example, commercial companies, not for profit organisations, governmental agencies, and business units within organisations. Criteria to qualify for the assignment of a GS1 Company Prefix are set by the GS1 Member Organisations.
concatenation	The representation of several Element Strings in one bar code symbol.
coupon	A voucher that can be redeemed at the Point-of-Sale for a cash value or free item.
customer	The party that receives, buys, or consumes an item or service.
data carrier	A means to represent data in a machine readable form; used to enable automatic reading of the Element Strings.
data character	A letter, digit, or other symbol represented in the data field(s) of an element string.
data field	The smallest part of the data part of an Element String that needs to be distinguished.
data titles	A standard abbreviated description of a data field; used to denote the Human Readable Interpretation of encoded data.
direct print	A process in which the printing apparatus prints the symbol by making physical contact with a substrate (e.g., flexography, ink jet, dot peening).
EAN/UPC Symbology	A family of bar code symbols including EAN-8, EAN-13, UPC-A, and UPC-E Bar Code Symbols. Although UPC-E Bar Code Symbols do not have a separate Symbology Identifier, they act like a separate symbology through the scanning application software. See also EAN-8 Bar Code Symbol, EAN-13 Bar Code Symbol, UPC-A Bar Code Symbol, and UPC-E Bar Code Symbol.
EAN-13 Bar Code Symbol	A bar code symbol of the EAN/UPC Symbology that encodes GTIN-13, Coupon-13, RCN-13, and VMN-13.
EAN-8 Bar Code Symbol	A bar code symbol of the EAN/UPC Symbology that encodes GTIN-8.
EANCOM®	The GS1 standard for Electronic Data Interchange (EDI) is a detailed implementation guideline of the UN/EDIFACT standard messages using the GS1 Identification Keys.

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Electronic Commerce	The conduct of business communications and management through electronic methods, such as Electronic Data Interchange (EDI) and automated data collection systems.
Electronic Message	A composition of Element Strings from scanned data and transaction information assembled for data validation and unambiguous processing in a user application.
Element String	A piece of data defined in structure and meaning, comprising an identification part (prefix or Application Identifier) and a data part, represented in a GS1 System endorsed data carrier.
Extension digit	A digit, allocated by the user, used to increase the capacity of the Serial Reference within the SSCC (Serial Shipping Container Code).
fixed length	Term used to describe a data field in an Element String with an established number of characters.
Fixed Measure Trade Item	An item always produced in the same pre-defined version (e.g., type, size, weight, contents, design) that may be sold at any point in the supply chain.
Function Code 1 (FNC1)	A symbology element used to form the double start pattern of a GS1-128 Bar Code Symbol. It is also used to separate certain concatenated Element Strings, dependent on their positioning in the bar code symbol.
General Distribution Scanning	Scanning environments that include bar coded trade items packaged for transport, logistic units, assets and location tags.
Global Individual Asset Identifier	The GS1 Identification Key for an individual asset.
Global Location Number	The GS1 Identification Key to identify physical or legal entities.
Global Returnable Asset Identifier	The GS1 Identification Key for returnable assets.
Global Service Relation Number	The GS1 Identification Key used to identify the relationship between a service provider and service recipient.
Global Trade Item Number®	The GS1 Identification Key for trade items.
GS1 Check Digit Calculation	A GS1 System algorithm for the calculation of a Check Digit to verify accuracy of data.
GS1 Company Prefix	Part of the GS1 System identification number consisting of a GS1 Prefix and a Company Number, both of which are allocated by GS1 Member Organisations.
GS1 General Specifications	Defines the GS1 System data and application standards related to the marking and automatic identification of trade items, locations, logistic units, assets, and more using bar code, RFID, and GS1 Identification Keys.
GS1 Global Office	Based in Brussels, Belgium, and Princeton, USA, is an organisation of GS1 Member Organisations that manages the GS1 System.
GS1 Identification Key	A numeric or alphanumeric field managed by GS1 to ensure the global, unambiguous uniqueness of the identifier in the open demand or supply chain.
GS1 Identification Keys	A globally managed system of numbering used by all GS1 Business Units to identify trade items, logistic units, locations, legal entities, assets, service relationships, and more. The Keys are built by combining GS1 member company identifiers (GS1 Company Prefix) with standards based rules for allocating reference numbers.
GS1 Member Organisation	A member of GS1 that is responsible for administering the GS1 System in its country (or assigned area). This task includes, but is not restricted to, ensuring user companies make correct use of the GS1 System, have access to education, training, promotion and implementation support and have access to play an active role in GSMP.

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GS1 Prefix	A number with two or more digits, administered by the GS1global Office that is allocated to GS1 Member Organisations or for Restricted Circulation Numbers.
GS1 System	The specifications, standards, and guidelines administered by GS1.
GS1 XML	A component of GS1 eCom. It represents the GS1 standard for Extensible Markup Language schemas providing users with a global business messaging language of e-business to conduct efficient Internet-based electronic commerce.
GS1-128 Bar Code Symbol	A subset of the Code 128 that is utilised exclusively for GS1 System data structures.
GS1-8 Prefix	A one-, two-, or three-digit index number, administered by GS1, denoting the area of distribution of trade items identified by a GTIN-8 or a number used in internal application (see RCN-8).
GTIN® Format	The format in which Global Trade Item Numbers® (GTINs®) must be represented in a 14-digit reference field (key) in computer files to ensure uniqueness of the identification numbers.
GTIN-8	The 8-digit GS1 Identification Key composed of a GS1-8 Prefix, Item Reference, and Check Digit used to identify trade items.
GTIN-12	The 12-digit GS1 Identification Key composed of a U.P.C. Company Prefix, Item Reference, and Check Digit used to identify trade items.
GTIN-13	The 13-digit GS1 Identification Key composed of a GS1 Company Prefix, Item Reference, and Check Digit used to identify trade items.
GTIN-14	The 14-digit GS1 Identification Key composed of an Indicator digit (1-9), GS1 Company Prefix, Item Reference, and Check Digit used to identify trade items.
Human Readable Interpretation	Characters that can be read by persons, such as letters and numbers, as opposed to symbol characters within bar code symbols, which are read by machines.
Indicator	A digit from 1 to 9 in the leftmost position of the GTIN-14.
Item Reference	The part of the data structure allocated by the user to identify a trade item for a given GS1 Company Prefix.
ITF Symbology	The Interleaved 2 of 5 Symbology.
ITF-14 Bar Code Symbol	An ITF Symbol used by the GS1 System to carry GTINs.
Local Assigned Code	A particular use of the UPC-E Bar Code Symbol for restricted distribution.
Location Reference	A number within a Global Location Number (GLN) assigned by various parties to identify a different entity.
logistic measures	Measures indicating the outside dimensions, total weight, or volume inclusive of packing material of a logistic unit. Also known as gross-measures.
logistic unit	An item of any composition established for transport and/or storage that needs to be managed through the supply chain. It is identified with SSCC.
magnification	Different sizes of bar code symbols based on a nominal size and a fixed aspect ratio; stated as a percent or decimal equivalent of a nominal size.
Modulo 10	Modulo 10 creates a Check Digit according to the Modulo 10 algorithm specified in the GS1 General Specifications.
Point-of-Sale (POS)	Refers to the retail type checkout where bar code symbols are normally scanned.
Quiet Zone	A clear space containing no machine-readable marks, which precedes the Start Character of a bar code symbol and follows the Stop Character. Formerly referred to as “Clear Area” or “Light Margin.”
Quiet Zone Indicator	A greater than (>) or less than (<) character, printed in the human readable field of the bar code symbol, with the tip aligned with the outer edge of the Quiet Zone.

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Restricted Circulation Numbers	Signifies a GS1 identification number used for special applications in restricted environments, defined by the local GS1 Member Organisation (e.g., restricted within a country, company, industry). They are allocated by GS1 for either internal use by companies or to GS1 Member Organisations for assignment based on business needs in their country (e.g., variable measure product identification, couponing).
scanner	An electronic device to read bar code symbols and convert them into electrical signals understandable by a computer device.
Serial Shipping Container Code	The GS1 Identification Key for logistic units.
substrate	The material on which a bar code symbol is printed.
supplier	The party that produces, provides, or furnishes an item or service.
symbol	The combination of symbol characters and features required by a particular symbology, including Quiet Zone, Start and Stop Characters, data characters, and other auxiliary patterns, which together form a complete scannable entity; an instance of a symbology and a data structure.
symbol character	A group of bars and spaces in a symbol that is decoded as a single unit. It may represent an individual digit, letter, punctuation mark, control indicator, or multiple data characters.
Symbol Contrast	An ISO 15416 parameter that measures the difference between the largest and smallest reflectance values in a Scan Reflectance Profile (SRP).
symbology	A defined method of representing numeric or alphabetic characters in a bar code; a type of bar code.
trade item	Any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain.
trade measures	Net measures of Variable Measure Trade Items as used for invoicing (billing) the trade item.
transaction type	Information (not part of the GS1 System) denoting the particular operation in connection with which the scanned data has been captured.
truncation	Printing a symbol shorter than the symbology specification's minimum height recommendations. Truncation can make the symbol difficult for an operator to scan.
U.P.C. Company Prefix	A special representation of a GS1 Company Prefix constructed from a U.P.C. Prefix and a Company Number. The U.P.C. Company Prefix is only used to create GTIN-12, Coupon-12, RCN-12, and VMC-12, which are encoded in a U.P.C. Bar Code Symbol.
U.P.C. Prefix	A special representation of the GS1 Prefixes '00 – 09' with the leading zero removed.
unrestricted distribution	Signifies that such system data may be applied on goods to be processed anywhere in the world without restraint as to such things as country, company, and industry.
UPC-A Bar Code Symbol	A bar code symbol of the EAN/UPC Symbology that encodes GTIN-12, Coupon-12, RCN-12, and VMN-12.
UPC-E Bar Code Symbol	A bar code symbol of the EAN/UPC Symbology representing a GTIN-12 in six explicitly encoded digits using zero-suppression techniques.
variable measure trade item	An item always produced in the same pre-defined version (e.g., type, design, packaging) that may be sold at any point in the supply chain, which either may vary in weight/size by its nature or which may be traded without a pre-defined weight/size/length.
wide-to-narrow ratio	The ratio between the wide elements and the narrow elements in a bar code symbology, such as ITF-14, which has two different element widths.
X-dimension	The specified width of the narrow element in a bar code symbol.

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15. APPENDICES

APPENDIX 1: Standard Check Digit Calculations of GS1 Data Structures

	Digit positions																	
GTIN-8											N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8
GTIN-12						N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	
GTIN-13					N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	
GTIN-14				N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}	
SSCC	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}	N_{15}	N_{16}	N_{17}	N_{18}
	Multiply value of each position by																	
	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	
	Accumulated results = ***Sum***																	
	Subtract ***sum*** from nearest multiple of ten = ***Check Digit***																	

Example of a Check Digit calculation for the 18 digit field																		
Positions	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}	N_{15}	N_{16}	N_{17}	N_{18}
Number ***without*** Check Digit	3	7	6	1	0	4	2	5	0	0	2	1	2	3	4	5	6	
Step 1: Multiply	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
by	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	
Step 2: Add up	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	
results to ***sum***	9	7	18	1	0	4	6	5	0	0	6	1	6	3	12	5	18	= 101
Step 3: Subtract ***sum*** from nearest multiple of ten (110) = Check Digit (9)																		
Number ***with*** Check Digit	3	7	6	1	0	4	2	5	0	0	2	1	2	3	4	5	6	**9**

An online Check Digit calculator is available on http://www.gs1.org

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APPENDIX 2: GTIN-12 Identification Numbers in a UPC-E Symbol

GTIN-12 item Identification Numbers beginning with the ***U.P.C. Prefix 0*** may be represented in a small bar code symbol named UPC-E. The GTIN-12 Item Number is condensed into a bar code symbol consisting of six symbol character positions. For application processing, the item number must be transformed into its full length by the bar code reader software or by the application software. ***There is no UPC-E six-digit trade item number.***

UPC-E option for the identification of trade items (GTIN)

GTIN-12 Identification number of trade													Represented in UPC-E symbol positions					
Company prefix							Item reference number					Check digit						
	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	1	2	3	4	5	6
(0)	0	0	0	0	0	0	1	0	0	0	0	5	4	0	0	0	0	1	'5'
(0)	0	9	9	9	9	9	9	0	0	0	0	9	2	9	9	9	9	9	'9'
= 5 UPC-E Applications																			
(0)	0	0	0	0	0	1	0	0	0	0	0	0	7	0	0	0	1	0	'4'
(0)	0	9	9	9	9	0	0	0	0	0	0	9	1	9	9	9	9	9	'4'
= 10 UPC-E Applications																			
(0)	0	0	0	3	0	0	0	0	0	0	0	0	7	0	0	3	0	0	'3'
(0)	0	9	9	9	0	0	0	0	0	9	9	9	5	9	9	9	9	9	'3'
= 100 UPC-E Applications																			
(0)	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	'0'
(0)	0	9	9	2	0	0	0	0	9	9	9	9	9	9	9	9	9	9	'2'
= 1000 UPC-E Applications																			

Company prefixes showing 000000 and 001000 to 007999 in positions N_1 to N_6 are not available in this UPC-E option (see next page).

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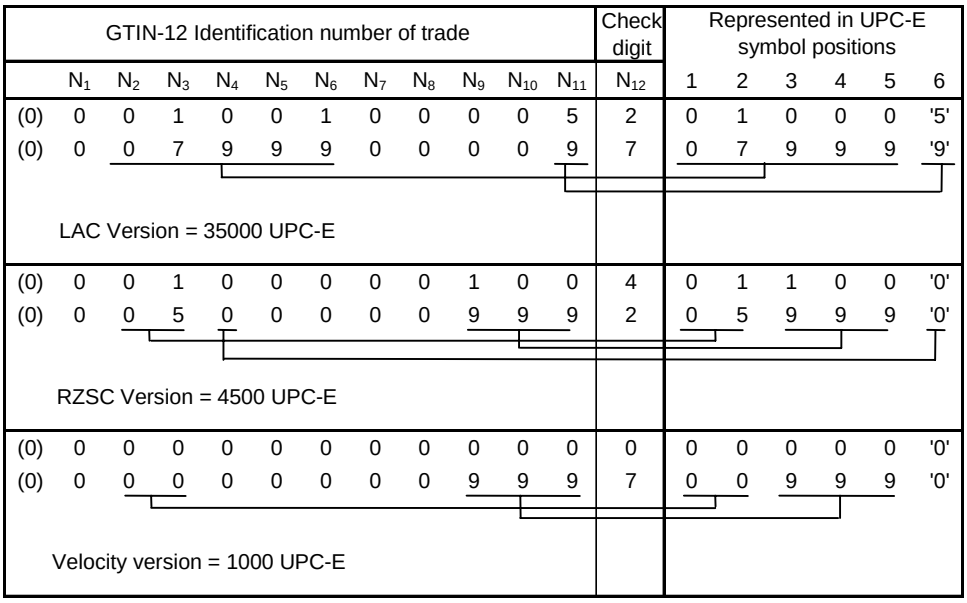
UPC-E option for the identification of trade items for company internal distribution



The above figure shows the construction principle of UPC-E for trade item numbering for ***restricted distribution*** (company internal). These Identification Numbers are not unambiguous when leaving the applying company.

Remarks concerning the above two tables

Each number position must only contain the digits shown in the upper and lower lines of each section and those in-between. On decoding, the extension to full length is determined by the value of the number in single quotes in the column ***Represented in UPC-E symbol positions***.

The ***Check Digit***, calculated as described in Appendix 1, applies to the entire Identification Number. In the UPC-E bar code symbol it is implicitly represented by the parity combination of the six symbol characters which are actually encoded.

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APPENDIX 3: Dimensions of modules and symbols at different magnification factor.

Magnification factor	Module width (ideal) [mm]	**EAN-13/UPC-A** dimensions [mm]		**EAN-8** dimensions [mm]	
		Width	Height	Width	Height
0.80	0.264	29.83	20.73	21.38	17.05
0.85	0.281	31.70	22.02	22.72	18.11
0.90	0.297	33.56	23.32	24.06	19.18
0.95	0.313	35.43	24.61	25.39	20.24
1.00	0.330	37.29	25.91	26.73	21.31
1.05	0.346	39.15	27.21	28.07	22.38
1.10	0.363	41.02	28.50	29.40	23.44
1.15	0.379	42.88	29.80	30.74	24.51
1.20	0.396	44.75	31.09	32.08	25.57
1.25	0.412	46.61	32.39	33.41	26.64
1.30	0.429	48.48	33.68	34.75	27.70
1.35	0.445	50.34	34.98	36.09	28.77
1.40	0.462	52.21	36.27	37.42	29.83
1.45	0.478	54.07	37.57	38.76	30.90
1.50	0.495	55.94	38.87	40.10	31.97
1.55	0.511	57.80	40.16	41.43	33.03
1.60	0.528	59.66	41.46	42.77	34.10
1.65	0.544	61.53	42.75	44.10	35.16
1.70	0.561	63.39	44.05	45.44	36.23
1.75	0.577	65.26	45.34	46.78	37.29
1.80	0.594	67.12	46.64	48.11	38.36
1.85	0.610	68.99	47.93	49.45	39.42
1.90	0.627	70.85	49.23	50.79	40.49
1.95	0.643	72.72	50.52	52.12	41.55
2.00	0.660	74.58	51.82	53.46	42.62

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APPENDIX 4: GS1 Application Identifiers

All Application Identifiers

AI	Full Title	Format	Data Title
00	Serial Shipping Container Code	n2+n18	SSCC
01	Global Trade Item Number	n2+n14	GTIN
02	GTIN of trade items contained in a logistic unit	n2+n14	CONTENT
10	Batch or Lot Number	n2+an..20	BATCH/LOT
11[1]	Production Date (YYMMDD)	n2+n6	PROD DATE
12[1]	Due Date (YYMMDD)	n2+n6	DUE DATE
13[1]	Packaging Date (YYMMDD)	n2+n6	PACK DATE
15[1]	Best Before Date (YYMMDD)	n2+n6	BEST BEFORE or SELL BY
17[1]	Expiration Date (YYMMDD)	n2+n6	USE BY or EXPIRY
20	Product Variant	n2+n2	VARIANT
21	Serial Number	n2+an..20	SERIAL
22	Secondary Data For Specific Health Industry Products	n2+an..29	QTY / DATE / BATCH
240	Additional Product Identification Assigned by The Manufacturer	n3+an..30	ADDITIONAL ID
241	Customer Part Number	n3+an..30	CUST. PART No.
250[2]	Secondary Serial Number	n3+an..30	SECONDARY SERIAL
251[2]	Reference to Source Entity	n3+an..30	REF TO SOURCE
253	Global Document Type Identifier	n3+n13+n..17	DOC. ID
254	GLN Extension component	n3+an..20	GLN EXTENSION
30	Variable Count	n2+n..8	VAR. COUNT
310n-369n	(Trade And Logistic Measurements) ***See next pages***	n4+n6	**See next pages**
337n	Kilograms per square metre	n4+n6	KG PER m^2

[1] When only year and month are required, DD must be filled with "00"

[2] The actual Data Title may be specified by the issuer of the data

(n) Indicates the decimal point position.

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All Application Identifiers (*continued*)

37	Count of Trade Items Contained in a Logistic Unit	n2+n..8	COUNT
390(n)	Amount Payable – single monetary area	n4+n..15	AMOUNT
391(n)	Amount Payable – with ISO currency code	n4+n3+n..15	AMOUNT
392(n)	Amount Payable for a Variable Measure Trade Item – single monetary unit	n4+n..15	PRICE
393(n)	Amount Payable for a Variable Measure Trade Item – with ISO currency code	n4+n3+n..15	PRICE
400	Customer's Purchase Order Number	n3+an..30	ORDER NUMBER
401	Consignment Number	n3+an..30	CONSIGNMENT
402	Shipment Identification Number	n3+n17	SHIPMENT NO.
403	Routing Code	n3+an..30	ROUTE
410	"Ship To - Deliver To" Global Location Number	n3+n13	SHIP TO LOC
411	"Bill To - Invoice To" Global Location Number	n3+n13	BILL TO
412	"Purchased From" Global Location Number	n3+n13	PURCHASE FROM
413	"Ship For - Deliver For - Forward To" Global Location Number	n3+n13	SHIP FOR LOC
414	Identification of a Physical Location, Global Location Number	n3+n13	LOC No
415	Global Location Number of the Invoicing Party	n3+n13	PAY TO
420	"Ship To - Deliver To" Postal Code Within a Single Postal Authority	n3+an..20	SHIP TO POST
421	"Ship To - Deliver To" Postal Code With 3 Digit ISO Country Code	n3+n3+an..9	SHIP TO POST
422	Country of Origin of a Trade Item	n3+n3	ORIGIN
423	Country of Initial Processing	n3+n3+n..9	COUNTRY - INITIAL PROCESS.
424	Country of Processing	n3+n3	COUNTRY - PROCESS.
425	Country of Disassembly	n3+n3	COUNTRY - DISASSEMBLY
426	Country covering full Process Chain	n3+n3	COUNTRY – FULL PROCESS

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(n) Indicates the decimal point position.

All Application Identifiers (*continued*)

7001	NATO Stock Number	n4+n13	NSN
7002	UN/ECE Meat Carcasses and Cuts Classification	n4+an..30	MEAT CUT
703(s)[3]	Approval number of processor with ISO country code	n4+n3+an..27	PROCESSOR # *s*[3]
8001	Roll Products - Width, Length, Core Diameter, Direction And Splices	n4+n14	DIMENSIONS
8002	Electronic Serial Identifier For Cellular Mobile Telephones	n4+an..20	CMT No
8003	Global Returnable Asset Identifier	n4+n14+an..16	GRAI
8004	Global Individual Asset Identifier	n4+an..30	GIAI
8005	Price Per Unit of Measure	n4+n6	PRICE PER UNIT
8006	Identification of the Component of a Trade Item	n4+n14+n2+n2	GCTIN
8007	International Bank Account Number	n4+an..30	IBAN
8008	Date and Time of Production	n4+n8+n..4	PROD TIME
8018	Global Service Relation Number	n4+n18	GSRN
8020	Payment Slip Reference Number	n4+an..25	REF No
8100	GS1-128 Coupon Extended Code - NSC + Offer Code	n4+n1+n5	-
8101	GS1-128 Coupon Extended Code - NSC + Offer Code + End Of Offer Code	n4+n1+n5+n4	-
8102	GS1-128 Coupon Extended Code - NSC	n4+n1+n1	-
90[2]	Information Mutually Agreed Between Trading Partners (Including FACT DIs)	n2+an..30	INTERNAL
91-99[2]	Company Internal Information	n2+an..30	INTERNAL

[2] The actual Data Title may be specified by the issuer of the data
[3] The fourth digit of this AI, "s," indicates the sequence of the processors in the supply chain

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Metric trade measures

AI	Full title Data Format n6	Unit of Measure	Data title
310 (n)	Net weight	Kilograms	NET WEIGHT (kg)
311 (n)	Length or 1st dimension, trade	Metres	LENGTH (m)
312 (n)	Width, diameter or 2nd dimension, trade	Metres	WIDTH (m)
313 (n)	Depth, thickness, height or 3rd dimension, trade	Metres	HEIGHT (m)
314 (n)	Area, trade	Square Metres	AREA (m^2)
315 (n)	Net volume	Litres	NET VOLUME (l)
316 (n)	Net volume	Cubic Metres	NET VOLUME (m^3)

(n) Indicates the decimal point position.

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Non-metric trade measures

AI	Full title Data Format n6	Unit of Measure	Data title
320 (n)	Net weight	Pounds	NET WEIGHT (lb)
321 (n)	Length or 1st dimension, trade	Inches	LENGTH (i)
322 (n)	Length or 1st dimension, trade	Feet	LENGTH (f)
323 (n)	Length or 1st dimension, trade	Yards	LENGTH (y)
324 (n)	Width, diameter or 2nd dimension, trade	Inches	WIDTH (i)
325 (n)	Width, diameter or 2nd dimension, trade	Feet	WIDTH (f)
326 (n)	Width, diameter or 2nd dimension, trade	Yards	WIDTH (y)
327 (n)	Depth, thickness, height or 3rd dimension, trade	Inches	HEIGHT (i)
328 (n)	Depth, thickness, height or 3rd dimension, trade	Feet	HEIGHT (f)
329 (n)	Depth, thickness, height or 3rd dimension, trade	Yards	HEIGHT (y)
350 (n)	Area, trade	Square Inches	AREA (i^2)
351 (n)	Area, trade	Square Feet	AREA (f^2)
352 (n)	Area, trade	Square Yards	AREA (y^2)
356 (n)	Net weight	Troy Ounces	NET WEIGHT (t)
357 (n)	Net volume	Ounces (U.S.)	NET VOLUME (oz)
360 (n)	Net volume	Quarts	NET VOLUME (q)
361 (n)	Net volume	Gallons (U.S.)	NET VOLUME (g)
364 (n)	Net volume	Cubic Inches	NET VOLUME (i^3)
365 (n)	Net volume	Cubic Feet	NET VOLUME (f^3)
366 (n)	Net volume	Cubic Yards	NET VOLUME (y^3)

(n) Indicates the decimal point position.

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Metric logistic measures

AI	Full title Data Format n6	Unit of Measure	Data title
330 (n)	Gross weight	Kilograms	GROSS WEIGHT (kg)
331 (n)	Length or 1st dimension, logistics	Metres	LENGTH (m), log
332 (n)	Width, diameter or 2nd dimension, logistics	Metres	WIDTH (m), log
333 (n)	Depth, thickness, height or 3rd dimension, logistics	Metres	HEIGHT (m), log
334 (n)	Area, logistics	Square Metres	AREA (m^2), log
335 (n)	Gross volume	Litres	VOLUME (l), log
336 (n)	Gross volume	Cubic Metres	VOLUME (m^3), log

(n) Indicates the decimal point position.

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Non-metric logistic measures

AI	Full title Data Format n6	Unit of Measure	Data title
340 (n)	Gross weight	Pounds	GROSS WEIGHT (lb)
341 (n)	Length or 1st dimension, logistics	Inches	LENGTH (i), log
342 (n)	Length or 1st dimension, logistics	Feet	LENGTH (f), log
343 (n)	Length or 1st dimension, logistics	Yards	LENGTH (y), log
344 (n)	Width, diameter or 2nd dimension, logistics	Inches	WIDTH (i), log
345 (n)	Width, diameter or 2nd dimension, logistics	Feet	WIDTH (f), log
346 (n)	Width, diameter or 2nd dimension, logistics	Yards	WIDTH (y), log
347 (n)	Depth, thickness, height or 3rd dimension, logistics	Inches	HEIGHT (i), log
348 (n)	Depth, thickness, height or 3rd dimension, logistics	Feet	HEIGHT (f), log
349 (n)	Depth, thickness, height or 3rd dimension, logistics	Yards	HEIGHT (y), log
353 (n)	Area, logistics	Square Inches	AREA (i^2), log
354 (n)	Area, logistics	Square Feet	AREA (f^2), log
355 (n)	Area, logistics	Square Yards	AREA (y^2), log
362 (n)	Gross volume	Quarts	VOLUME (q), log
363 (n)	Gross volume	Gallons (U.S.)	VOLUME (g), log
367 (n)	Gross volume	Cubic Inches	VOLUME (i^3), log
368 (n)	Gross volume	Cubic Feet	VOLUME (f^3), log
369 (n)	Gross volume	Cubic Yards	VOLUME (y^3), log

(n) Indicates the decimal point position.

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